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VL-FS-BTHQ 21603VSS-01 REV.B

(BTHQ 21603V-SRE-CONN.)

DOCUMENT TITLE:

SPECIFICATION

OF

LCD MODULE TYPE

ITEM NO.: BTHQ 21603VSS-01

APPROVALS: EFFECTIVE DATE

DEPARTMENT	NAME	SIGNATURE	DATE
MARKETING (TECHNICAL SUPPORT)	PHILIP CHENG	[illegible]	2002.1.15
LCM(DESIGN)	M.Y.LU	Lu M.Y.	2002.1.15
MARKETING (TECHNICAL SUPPORT)	CYRUS CHEUNG	[illegible]	2002/1/15

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DOCUMENT REVISION HISTORY 1:

DOCUMENT REVISION FROM TO	DATE	DESCRIPTION	CHANGED BY	CHECKED BY
A	2002.01.04	First Release	PHILIP CHENG	TOM LEE
A B	2002.01.14	Items 1 to 3 were updated: 1.) (Page 4, point 1) “(CON-IL-402)” was added. 2.)(Page 4, point 2) “(Excluded connector)” was added. 3.)(Page 5, Fig. 1) Outline drawing was updated.	PHILIP CHENG	M.Y.LU

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Specification
of
LCD Module Type
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1. General Description

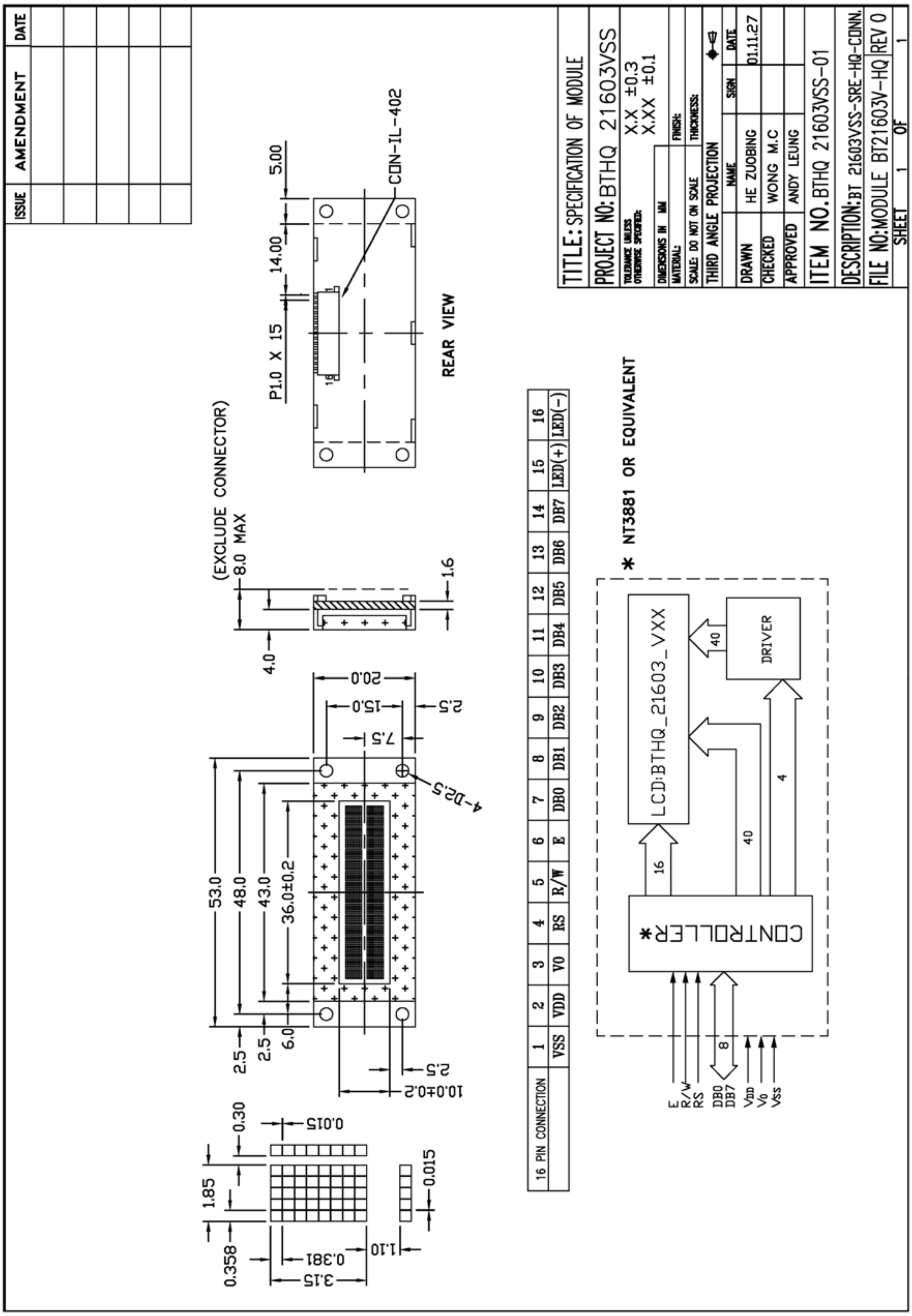
- 16 characters (5x8 dots) x 2 lines STN Positive Yellow Reflective Dot Matrix LCD module.
- Viewing Angle: 6 O'clock direction.
- Driving scheme: 1/16 Duty, 1/5 bias.
- 'NOVATEK' NT3881DH-01/AI (Die form) LCD Controller and Driver or equivalent
- 'SAMSUNG' KS0065B-PCC (Die form) or equivalent 40-Channel Segment/Common Driver for Dot Matrix LCD.
- Connector: 16 pins ZIF SMD connector (CON-IL-402).

2. Mechanical Specifications

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

Table 1

Parameter	Specifications	Unit
Outline dimensions	53.0(W) x 20.0(H) x 8.0 MAX.(D) (Excluded connector)	mm
Effective viewing area	36.0(W) x 10.0(H)	mm
Display format	16 characters x 2 lines	-
Character size	1.85(W) x 3.15(H) (5 x 8 dots)	mm
Character spacing	0.30(W) x 1.10(H)	mm
Character pitch	2.15(W) x 4.25(H)	mm
Dot size	0.358(W) x 0.381(H)	mm
Dot spacing	0.015(W) x 0.015(H)	mm
Dot pitch	0.373(W) x 0.396(H)	mm
Weight:	TBD	grams



16 PIN CONNECTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	VSS	VDD	V0	RS	R/W	E	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7	LED(+)	LED(-)

3. Absolute Maximum Ratings

3.1 Electrical Maximum Ratings(Ta = 25 ºC)

Table 2

Parameter	Symbol	Min.	Max.	Unit
Power Supply voltage (Logic)	VDD - VSS	-0.3	+7.0	V
Power Supply voltage (LCD drive)	VLCD=VDD – V0	-0.3	+13.5	V
Input voltage	Vin	-0.3	VDD +0.3	V

Note:

The modules may be destroyed if they are used beyond the absolute maximum ratings.

All voltage values are referenced to VSS = 0V.

3.2 Environmental Condition

Table 3

Item	Operating Temperature (Topr)		Storage Temperature (Tstg)		Remark
	Min.	Max.	Min.	Max.	
Ambient Temperature	0°C	+50°C	-10°C	+60°C	Dry
Humidity	95% max. RH for Ta ≤ 40°C < 95% RH for Ta > 40°C				no condensation
Vibration (IEC 68-2-6) cells must be mounted on a suitable connector	Frequency: 10 ~ 55 Hz Amplitude: 0.75 mm Duration: 20 cycles in each direction.				3 directions
Shock (IEC 68-2-27) Half-sine pulse shape	Pulse duration : 11 ms Peak acceleration: 981 m/s^2 = 100g Number of shocks : 3 shocks in 3 mutually perpendicular axes.				3 directions

4. Electrical Specifications

4.1 Interface signals

Table 4

Pin No.	Symbol	Description
1	VSS	Ground(0V).
2	VDD	Power supply for logic (+5V)
3	V0	Power supply for LCD driver
4	RS	Register Select Input: "High" for Data register (for read and write) "Low" for Instruction register (for write), Busy flag, address counter (for read)
5	R/W	Read/Write signal: " High" for Read mode. "Low" for Write mode.
6	E	Enable. Start signal for data read /write.
7	DB0	Data input/output (LSB)
8	DB1	Data input/output
9	DB2	Data input/output
10	DB3	Data input/output
11	DB4	Data input/output
12	DB5	Data input/output
13	DB6	Data input/output
14	DB7	Data input/output (MSB)
15	LED(+)	Anode of LED backlight
16	LED(-)	Cathode of LED backlight

4.2 Typical Electrical Characteristics

At Ta = 25 °C, VDD = 5V±5%, VSS=0V.

Table 5

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (Logic)	VDD-VSS		4.75	5.00	5.25	V
Supply voltage (LCD)	VLCD =VDD-V0	VDD =5.0V, Note1.	4.0	4.5	5.0	V
Input signal voltage 1 for E,DB0-DB7,R/W,RS.	V_{IH1}	"H" level	2.2	-	VDD	V
	V_{IL1}	" L" level	-0.3	-	0.8	V
Input signal voltage 2 for OSC1.	V_{IH2}	" H" level	VDD -1.0	-	VDD	V
	V_{IL2}	" L" level	VSS	-	1.0	V
Supply Current (Logic & LCD)	IDD	Character mode, Note 1	-	1.3	2.0	mA
Supply Current (LCD)	I0	Character mode, Note 1	-	0.2	0.3	mA

Note (1) : There is tolerance in optimum LCD driving voltage during production and it will be within the specified range.

4.3 Timing Specifications

At Ta = 0 °C To +50 °C , VDD = +5V±5%, VSS = 0V.

Refer to Fig. 2, the bus timing diagram for write mode.

Table 6

Parameter	Symbol	Min.	Max.	Unit	Remarks
Enable cycle time	t_{CYCE}	500	-	ns	
Enable "High" level pulse width	t_{WHE}	300	-	ns	
Enable rise time	t_{RE}	-	25	ns	
Enable fall time	t_{FE}	-	25	ns	
RS, R/W set-up time	t_{AS}	60	-	ns	8-bit operation mode
		100			4-bit operation mode
RS, R/W address hold time	t_{AH}	10	-	ns	
Data output delay	t_{DS}	100	-	ns	
Data hold time	t_{DHR}	10	-	ns	

Refer to Fig. 3, the bus timing diagram for read mode .

Table 7

Parameter	Symbol	Min.	Max.	Unit	Remarks
Enable cycle time	t_{CYCE}	500	-	ns	
Enable "High" level pulse width	t_{WHE}	300	-	ns	
Enable rise time	t_{RE}	-	25	ns	
Enable fall time	t_{FE}	-	25	ns	
RS, R/W set-up time	t_{AS}	60	-	ns	8-bit operation mode
		100			4-bit operation mode
RS, R/W address hold time	t_{AH}	10	-	ns	
Read data output delay	t_{RD}	-	190	ns	
Read data hold time	t_{DHR}	20	-	ns	

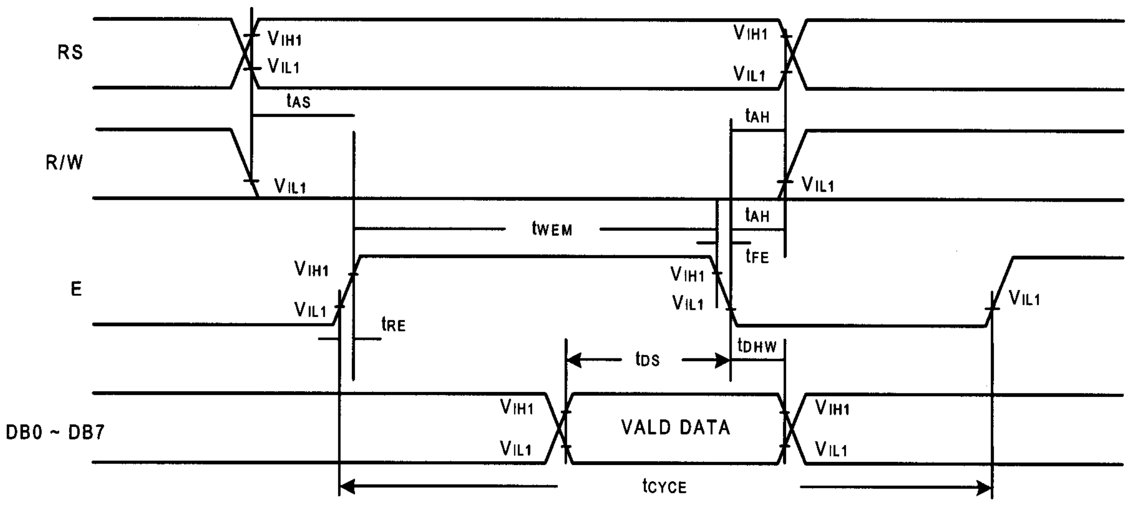


Figure 2: Bus write operation sequence (Writing data from MPU to NT3881).

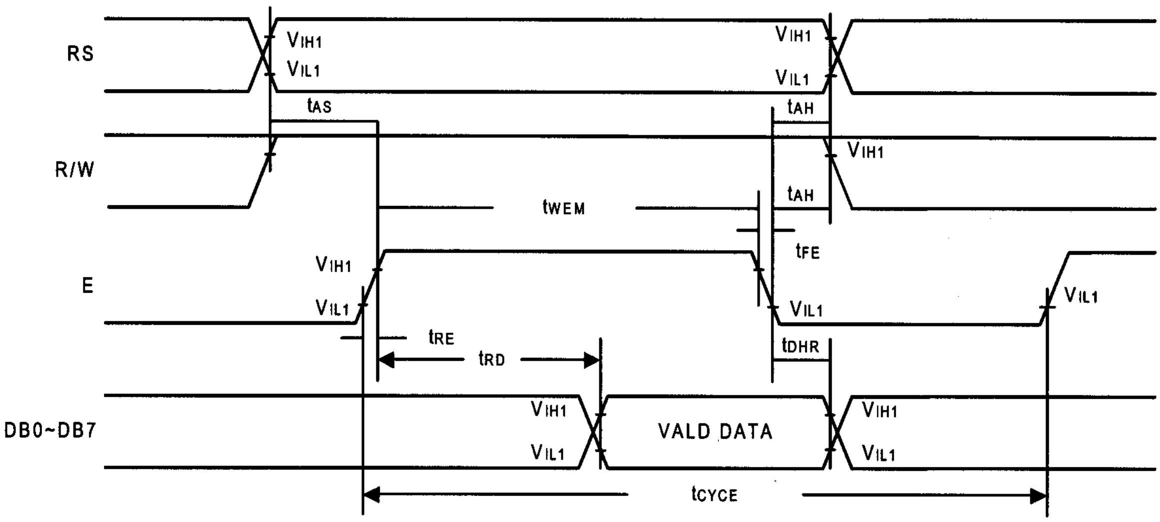


Figure 3: Bus read operation sequence (Reading out data from NT3881 to MPU).

4.4 Timing Diagram of VDD against V0.

Power on sequence shall meet the requirement of Figure 4, the timing diagram of VDD against V0.

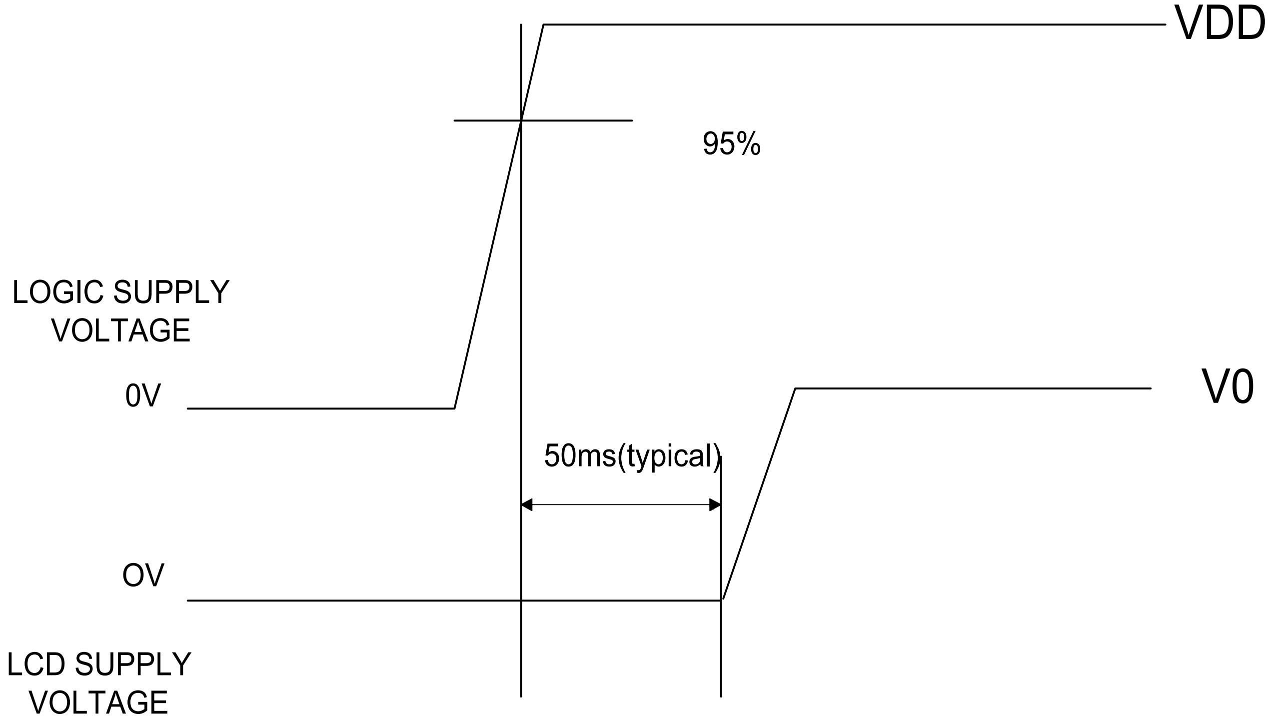


Figure 4: Timing diagram of VDD against V0.

4.5 Correspondence between Character Codes and Character Patterns (NOVATEK Standard NT3881D-01)

Higher 4-bit (D4 to D7) of Character Code (Hexadecimal)

Lower 4-bit (D0 to D3) of Character Code (Hexadecimal)	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	CG RAM (1)			0	@	P	`	p				ー	タ	ミ	α	p
1	CG RAM (2)		!	1	A	Q	a	q			。	ア	チ	ム	ä	q
2	CG RAM (3)		"	2	B	R	b	r			「	イ	ツ	メ	β	θ
3	CG RAM (4)		#	3	C	S	c	s			」	ウ	テ	モ	ε	∞
4	CG RAM (5)		$	4	D	T	d	t			、	エ	ト	ヤ	μ	Ω
5	CG RAM (6)		%	5	E	U	e	u			・	オ	ナ	ユ	σ	ü
6	CG RAM (7)		&	6	F	V	f	v			ヲ	カ	ニ	ヨ	ρ	Σ
7	CG RAM (8)		'	7	G	W	g	w			ァ	キ	ヌ	ラ	g	π
8	CG RAM (1)		(	8	H	X	h	x			ィ	ク	ネ	リ	√	x̄
9	CG RAM (2)		)	9	I	Y	i	y			ゥ	ケ	ノ	ル	⁻¹	y
A	CG RAM (3)		*	:	J	Z	j	z			ェ	コ	ハ	レ	j	千
B	CG RAM (4)		+	;	K	[	k	{			ォ	サ	ヒ	ロ	ˣ	万
C	CG RAM (5)		,	<	L	¥	l	|			ャ	シ	フ	ワ	¢	円
D	CG RAM (6)		-	=	M	]	m	}			ュ	ス	ヘ	ン	£	÷
E	CG RAM (7)		.	>	N	^	n	→			ョ	セ	ホ	゛	ñ	
F	CG RAM (8)		/	?	O	_	o	←			ッ	ソ	マ	゜	ö	█